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ABSTRACT

Height, weight, and triceps skinfold were measured in 1,680 Mexican American children, 10 through 14 years of age, from the Lower Rio Grande Valley (LRGV) region of Texas. Study sample measurements were compared to those gathered in 1972 involving LRGV Mexican American children as well as National Center for Health Statistics (NCHS) reference data for American children. Independent t tests were used to determine the significance of differences between the study sample and the two comparison groups. Among the boys, for all ages, significant (.01) increases existed between the study sample and 1972 measurements with significantly greater (.01) triceps skinfold than NCHS data. Girls' height, weight, and weight/height ratio increased significantly (.01 to .05) for all ages from 1972, but triceps were significantly greater among only the 10 and 11 year olds. No significant triceps differences existed between study group girls and NCHS data. Results indicated considerable growth and increased adiposity among Mexican American children in the past decade with current levels comparing favorably to NCHS norms. Based on the results, it was concluded that these increases over the period studied were due to some form of dietary intervention rather than ethnic-genetic factors. (Author/NEC)

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GROWTH OF MEXICAN-AMERICAN CHILDREN IN SOUTH TEXAS

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Growth of Mexican-American Children in South Texas

ABSTRACT

Height, weight, and triceps skinfold were measured in 1680 Mexican-American (M-A) children, 10 through 14 years of age, from the Lower Rio Grande Valley (LRGV) region of Texas. Study sample measurements were compared to those gathered in 1972 involving LRGV M-A children as well as National Center for Health Statistics (NCHS) reference data for American children. Independent t tests were used to determine the significance of differences between the study sample and the two comparison groups. Among the boys, for all ages, significant (.01) increases existed between the study sample and 1972 measurements with significantly greater (.01) triceps skinfold than NCHS data. Girls' height, weight, and weight/height ratio increased significantly (.01 to .05) for all ages from 1972, but triceps were significantly greater among only the 10 and 11 year olds. No significant triceps differences existed between study group girls and NCHS data. Results indicated considerable growth and increased adiposity among M-A children in the past decade with current levels comparing favorably to NCHS norms. Based on the results, it was concluded these increases over the period studied were due to some form of dietary intervention rather than ethnic-genetic factors.

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Growth of Mexican-American Children in South Texas

Historically, growth studies comparing Mexican-American children with reference data comprised of non-Hispanic children have reported significant deficits in height, weight, and adiposity (Manuel, 1934; Meredith and Goldstein, 1952; Lantz and Wood, 1958; Chase et al., 1971; Center for Disease Control, 1972). More recent investigations have attempted to evaluate these deficits in terms of socioeconomic status and behavioral patterns. Malina and Zavaleta (1980) investigated for evidence of a secular trend in statures and weights among Mexican-American children in Texas from 1930 to 1970 and found the magnitude of secular change per decade to be considerably smaller than that for black, white, European, and Japanese children. The primary reason cited for this limited secular trend was lower socioeconomic conditions associated with Spanish-surnamed populations. Using data collected through the Arizona Nutrition Surveillance Program, Yanochik-Owen and White (1977) reported over-nutrition and high weight for height among 2241 low income Mexican-American youth whose parents had access to recently instituted nutritional programs. A later investigation of infants whose mothers participated in food assistance programs found the Mexican-American child to have greater weight for length, subscapular skinfolds, and estimates of body fat than his or her anglo counterpart (Kautz and Harrison, 1981). Studies of children of migrant families from Northern California, an area with a high standard of living, reported weight for age, weight

for height, and height for age values similar to those of non-Spanish-surnamed children (Dewey et al., 1983; Dunn and Martorell, 1984). Zavaleta and Malina (1982) in a study of Mexican-American boys 9 through 14 years of age, indicated generally greater body density than non-Hispanic boys of the same age group.

In general, the more recent reports indicate a greater incidence of high weight for height with fewer children having low weight for age. In view of these deficit reversals, the present study deals with the growth and adiposity status of Mexican-American children in South Texas. Height, weight, and triceps skinfold results are compared with South Texas Mexican-American children sampled in 1972 (Zavaleta and Malina, 1980) and reference data for American children from the National Center for Health Statistics (NCHS) (Hamill et al., 1977; Johnson et al., 1981).

Methods

The subjects were 1680 Mexican-American boys and girls, 10 through 14 years of age, participating in the National Youth Sports Program in the Lower Rio Grande Valley (LRGV) of Texas. The study was conducted over a three year period during the 1983, 84, and 85 programs held on the Pan American University campus. Ethnicity was determined by the subject's surname.

Program guidelines stipulated that at least 90 percent of the participants meet poverty criteria established by the U. S. Department of Health and Human Services. Eligibility

of the children was determined by their participation in free or reduced school lunch programs and low income target area designation by the local Community Action Agency. The target area is identified as a Supply Class F Area, or one with critical surplus of labor (U. S. Department of Labor, 1985). During the period of the study, 1972-1985, this area had the highest unemployment level in the state of Texas. Mexican-American children sampled in 1972 and compared with the present study were drawn from Brownsville, Texas, an area whose population characteristics reflect those of the Lower Rio Grande Valley in general (Zavaleta, 1985).

Anthropometric indicators of growth status included height, weight, and triceps skinfold and measurements were taken in the same manner as those for Brownsville subjects (Zavaleta and Malina, 1980). Height was measured with an anthropometer with the subject in the standard erect position and shoes removed. Weight was taken on a balance beam scale to the nearest one-half pound and subsequently converted to kilograms. Body weight was measured with shoes removed and children wearing gym clothing (i.e., shorts and top). Triceps skinfold measurements were taken by a single observer with a Lange caliper to the nearest 0.1 millimeter in the same manner as the NCHS (1981). Triceps skinfold was measured at the level midway between the acromial process of the scapula and the elbow on the posterior aspect of the arm over the triceps muscle. Skinfold measurements were taken twice, and, where necessary, any discrepancies were resolved by means of a third measurement.

Subjects were grouped by age, according to their nearest birthday, into whole-year categories so that the mean age for each group approached the midpoint of the category. Data were gathered during the month of June for all three programs and no subjects were represented more than once.

Results and Discussion

Sample size per age group, means, standard deviations, and medians for all anthropometric dimensions are indicated in Table 1.

-Insert Table 1 here-

Through age 11 years, girls are slightly taller and weigh approximately the same as boys. At 12 years of age, girls maintain this height advantage but boys are heavier. After 12 years, boys are, on the average, taller and heavier. Triceps skinfold measurement is somewhat dissimilar to that of body weight. At each age group, with the exception of the 12 year olds, triceps skinfold is consistently larger in the girls studied.

To assess growth and adiposity status, independent t tests described by Dixon and Massey (1983) were used to determine the significance of differences between the study sample (LRGV) amd Mexican-Americans sampled in 1972 (Brownsville) and reference data for American children (NCHS). Table 2 shows analysis of mean heights, weights, weight/height ratios, and triceps skinfolds of LRGV versus Brownsville and NCHS children and Figures 1 through 8 present a graphic comparison of mean values for the three samples.

-Insert Table 2 and Figures 1 through 8 here-

TABLE 1. Means, standard deviations, and medians for all anthropometric dimensions

Age (yrs)	n	Height (cm)			Weight (kg)			Triceps (mm)		
		M	SD	Md	M	SD	Md	M	SD	Md
					Males					
10	283	140.0	7.2	140.1	37.2	9.7	34.6	14.3	7.7	11.9
11	217	145.2	7.8	145.1	40.2	10.7	36.9	13.6	7.2	11.4
12	171	150.3	8.5	150.1	45.9	12.5	42.4	15.0	8.1	12.3
13	143	156.8	9.1	156.8	49.2	12.5	46.9	14.2	8.0	12.2
14	111	166.1	8.3	166.3	59.1	12.2	58.5	12.5	5.5	11.3
					Females					
10	229	140.2	7.5	140.0	37.1	9.8	34.8	15.6	6.8	14.0
11	202	146.6	8.3	147.2	40.9	9.4	39.2	15.0	6.4	13.4
12	149	150.7	7.2	151.2	43.8	8.8	42.6	13.7	4.4	13.1
13	100	154.7	7.4	154.7	48.5	10.9	46.4	14.8	6.5	12.5
14	75	156.1	8.6	156.7	53.4	13.9	50.8	17.0	7.4	14.8

TABLE 2. Comparison of mean heights, weights, weight/height ratios, and triceps skinfolds for study sample versus Brownsville and NCHS data

Age (yrs)	Brownsville N	Brownsville M	Brownsville t	NCHS N	NCHS M	NCHS t
Boys			Heights (cm)			
10	48	135.1	4.52**	89	139.8	0.26
11	48	140.2	4.38**	84	146.4	-1.30
12	57	146.0	3.73**	103	152.6	-2.25
13	51	151.5	3.66**	86	160.4	-2.94
14	52	157.9	6.23**	86	167.6	-1.33
			Weights (kg)			
10	48	30.9	7.16**	89	33.8	3.82**
11	48	34.3	4.70**	84	39.1	0.93
12	57	39.1	4.86**	103	43.3	2.04*
13	51	44.2	3.11**	86	50.6	0.96
14	52	48.5	6.38**	86	57.5	0.97
			Weight/Height Ratios (kg/cm)			
10	48	.22	4.21**			
11	48	.23	5.22**			
12	57	.24	5.60**			
13	51	.26	2.98**			
14	52	.29	5.10**			
			Triceps Skinfolds (mm)			
10	48	9.5	7.15**	148	10.9	5.82**
11	48	10.5	4.34**	178	11.9	2.48**
12	57	10.7	5.28**	200	11.9	4.06**
13	51	9.7	4.65**	174	11.2	3.59**
14	52	9.1	4.40**	1 4	10.3	3.13**

TABLE 2. Cont.

Age (yrs)	Brownsville N	Brownsville M	Brownsville t	NCHS N	NCHS M	NCHS t
Girls			Heights (cm)			
10	49	137.4	2.66**	95	140.3	-0.11
11	53	141.7	4.45**	76	146.3	0.28
12	50	149.1	1.55*	84	154.6	-4.31
13	51	149.8	4.46**	109	159.4	-5.21
14	65	154.7	1.96*	88	161.3	-4.32
			Weights (kg)			
10	49	33.1	3.53**	95	34.2	3.12**
11	53	36.6	3.38**	76	39.0	1.59*
12	50	43.3	0.35	84	46.0	-1.86
13	51	44.8	2.26**	109	52.9	-2.85
14	65	50.2	1.62*	88	56.3	-1.40
			Weight/Height Ratios (kg/cm)			
10	49	.21	5.29**			
11	53	.24	4.32**			
12	50	.26	3.67**			
13	51	.29	1.66*			
14	65	.30	2.95**			
			Triceps Skinfolds (mm)			
10	49	12.5	3.84**	197	13.1	4.36**
11	53	13.6	1.40*	166	14.5	0.59
12	50	14.0	-0.36	177	15.0	-2.27
13	51	15.0	-0.21	198	16.2	-1.73
14	65	17.2	0.18	184	17.5	-0.50

**Significant at the .01 level
*Significant at the .05 level

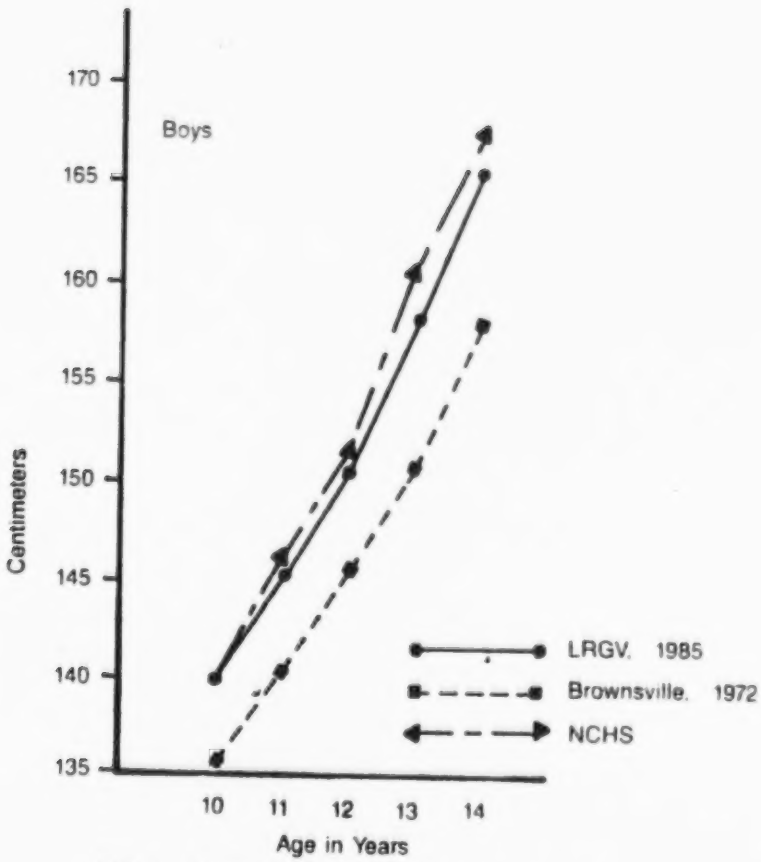

FIG. 1. Mean heights of LRGV boys compared to Brownsville and NCHS boys

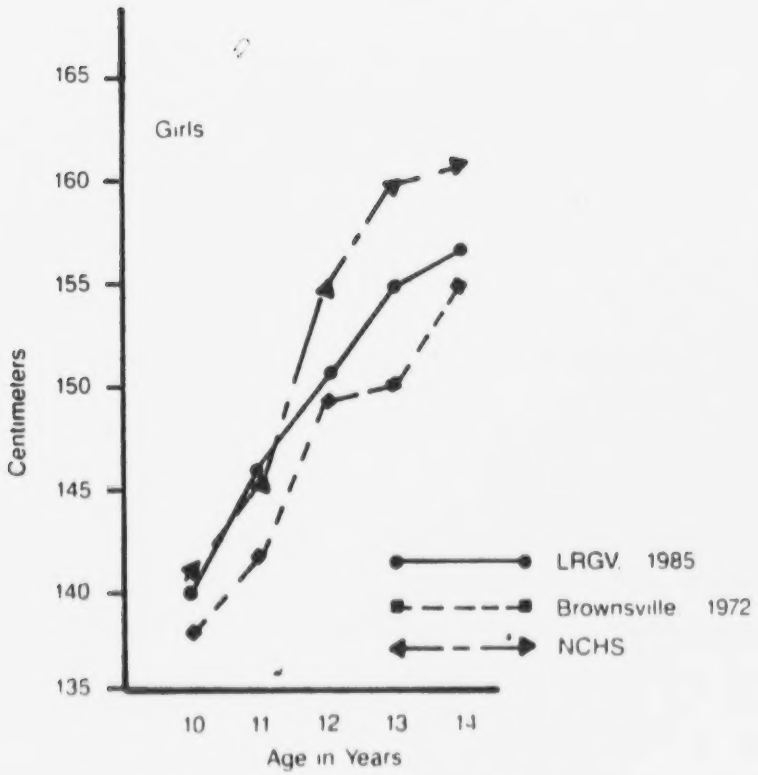

FIG 2 Mean heights of LRGV girls compared to Brownsville and NCHS girls

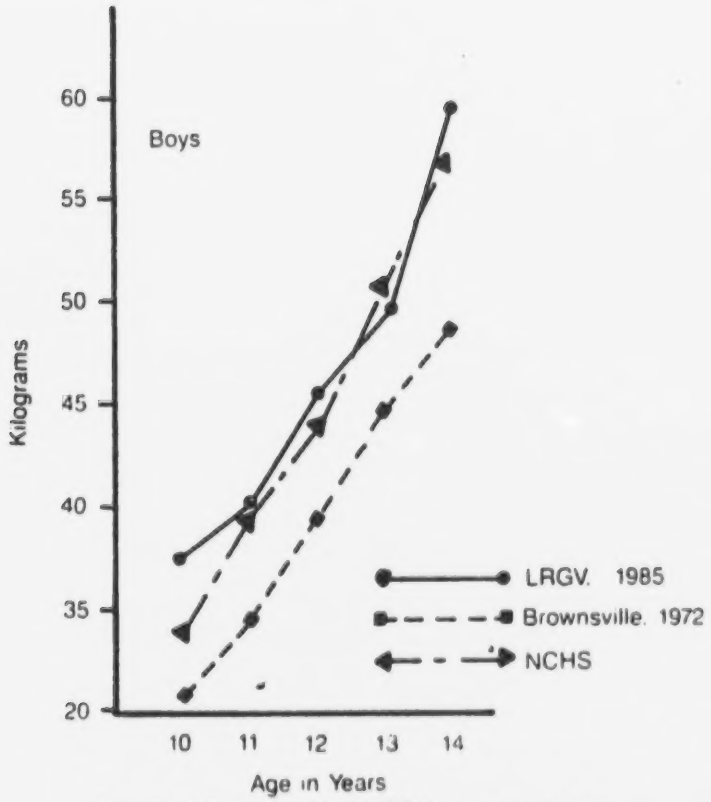

FIG 3 Mean weight of LRGV boys compared to Brownsville and NCHS boys

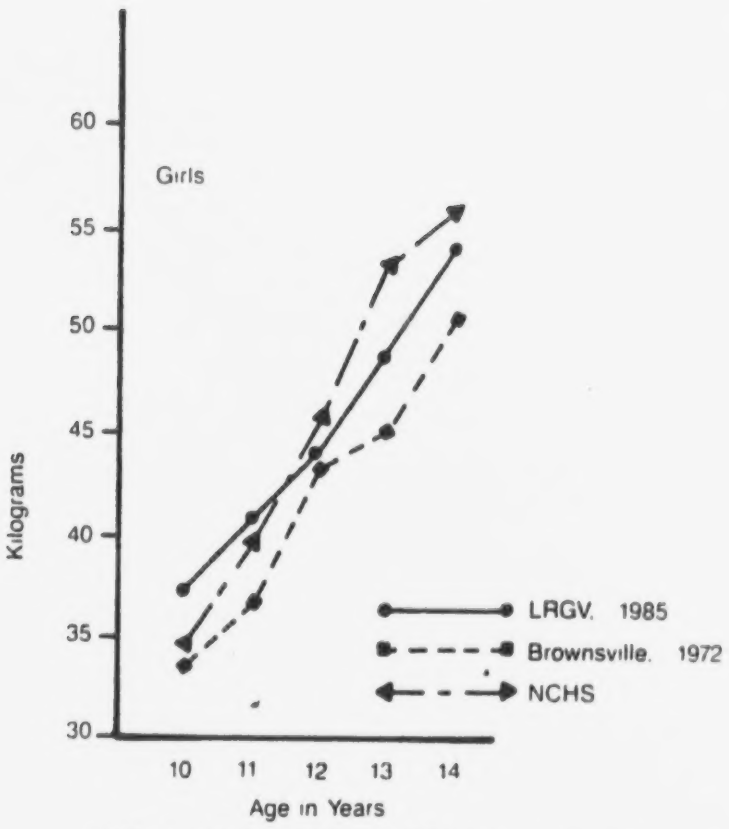

FIG. 4 Mean weights of LRGV girls compared to Brownsville and NCHS girls

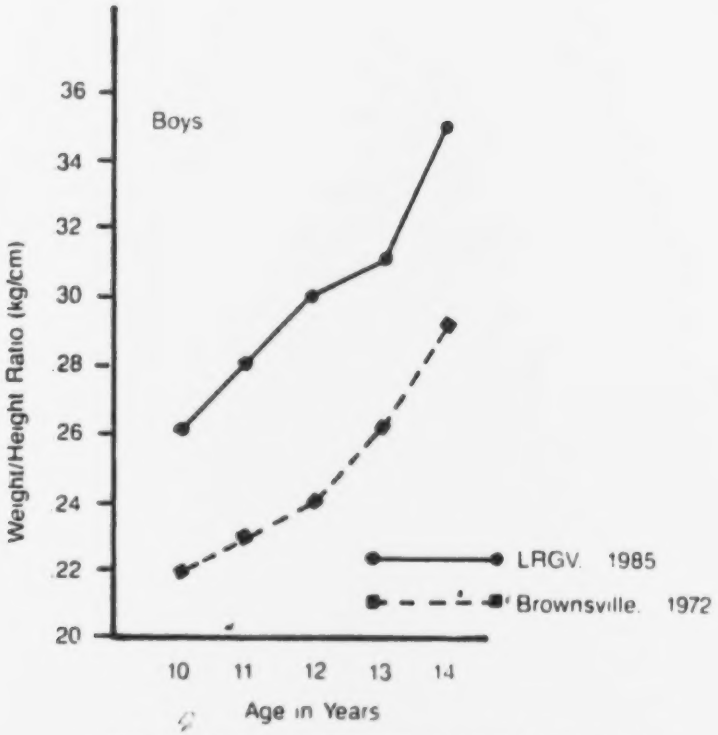

FIG 5 Mean weight/height ratios of LRGV boys compared to Brownsville boys

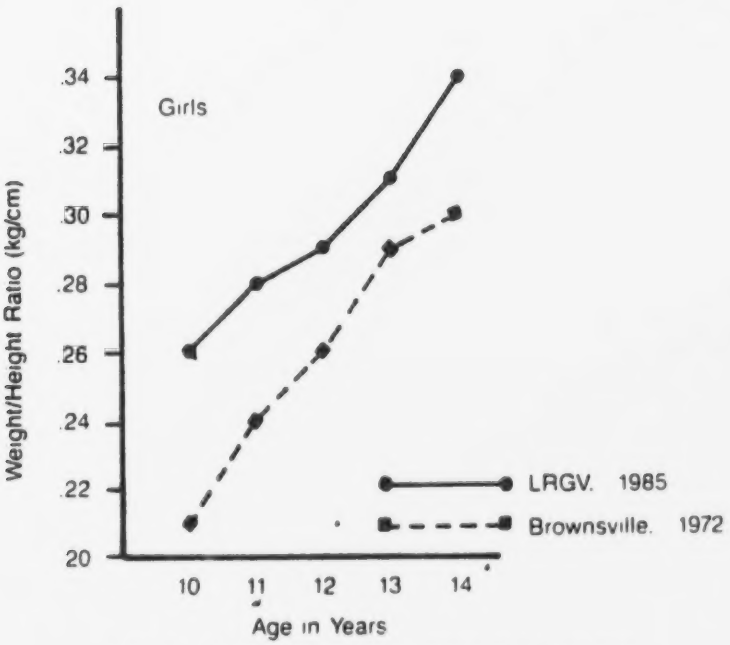

FIG 6 Mean weight/height ratios of LRGV girls compared to Brownsville girls

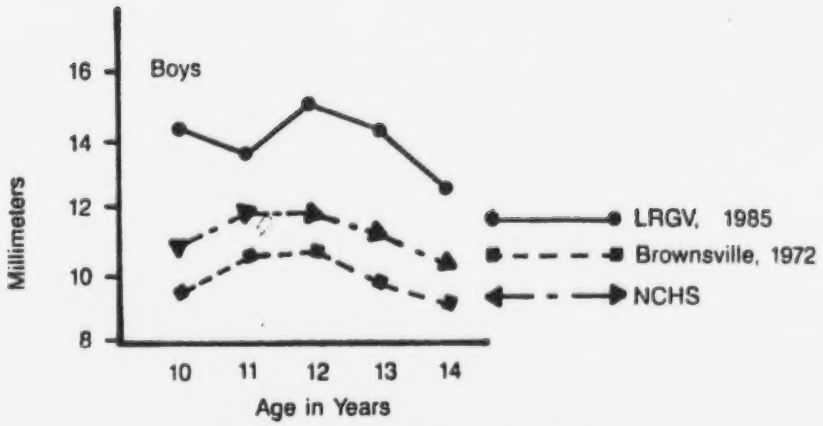

Fig. 7. Mean triceps skinfolds of LRGV boys compared to Brownsville and NCHS boys.

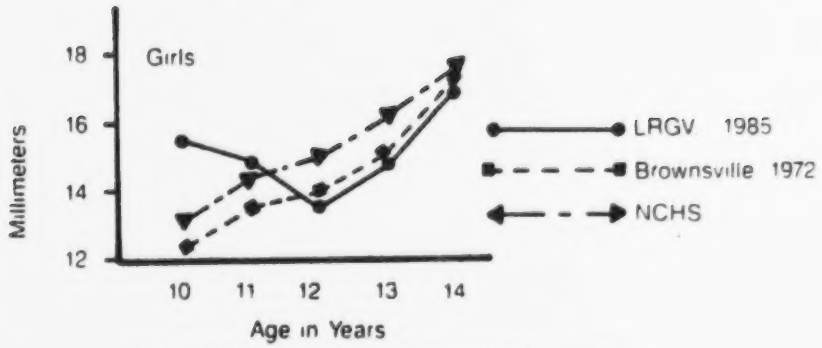

FIG 8. Mean triceps skinfolds of LRGV girls compared to Brownsville and NCHS girls

Comparisons of mean statures for boys and girls are illustrated in Figures 1 and 2. At all age levels, LRGV boys and girls are significantly taller than those tested in 1972. When compared with NCHS means, LRGV boys closely approximate national norms at ages 10 and 11 but are slightly shorter at 12, 13, and 14 years of age. This pattern is similar among girls but the differences in stature are much more pronounced at ages 12, 13, and 14.

Figure 3 indicates all LRGV boys are significantly heavier than Brownsville boys, and with the exception of the 13 year olds, are heavier than NCHS means. Study sample girls (Figure 4) are heavier than their Brownsville counterparts, but only the 10 and 11 year olds are heavier than NCHS girls. Weight/height ratios for LRGV and Brownsville children are given in Figures 5 and 6. Ratios for LRGV children were not compared with NCHS values due to the small differences in weight and height between the two samples. For both boys and girls, at all age levels, LRGV weight/height ratios are significantly greater than Brownsville children thus indicating greater body weights for a given stature.

Mean triceps skinfolds are shown in Figures 7 and 8; LRGV boys, at all ages, have significantly thicker skinfolds than Brownsville and NCHS values. At ages 10 and 11, LRGV girls have mean triceps skinfolds greater than Brownsville and NCHS girls, but the 12 and 13 year olds have smaller measurements than the two comparison samples. At age 14, all three groups have approximately the same fatfolds.

The results indicate the Mexican-American children sampled in 1985 are taller, heavier, and have greater weight/height ratios than Mexican-Americans tested in 1972. Triceps skinfold is significantly greater in LRGV boys than in Brownsville boys but slightly less in girls. When compared with reference data for American children, the study sample boys are approximately the same height and weight and have significantly thicker triceps skinfolds. Eleven and 12 year old girls are of equal heights, are heavier, and have greater triceps skinfolds than NCHS children. After 12 years of age, however, study sample girls are shorter and lighter and have slightly smaller skinfold thicknesses than NCHS girls.

While the study sample somewhat approximates NCHS standards, the growth deficits are significantly smaller than those determined in 1972. The time period involved, 1972 to 1985, suggests height, weight, and triceps skinfolds increases are due primarily to nutritional factors. The height and weight changes infer a diet higher in protein and calories. The Texas phase of the Ten State Nutrition Survey (Center for Disease Control, 1972) reported protein intakes generally less satisfactory among low-income Mexican-Americans than for whites but quite adequate caloric intakes. Subsequently, the dramatic increase in triceps skinfold indicates extremely high caloric intake (Jeffiffe and Jelliffe, 1969).

Zack and others (1979) indicate skinfold thickness and chronological age the most predictive of body fat; thus the anthropometric dimensions among the low income Mexican-American children studied

strongly suggest that by NCHS standards, a relatively high level of over-nutrition persists.

Increased food intakes may be due, in part, to the fact that the study group represents those who have access to various national nutrition programs. Greater food availability coupled with the tendency of the Mexican-American culture to encourage prolonged and high amounts of bottle feeding may serve to reinforce overeating in childhood (Caliendo, 1981). As Garn et al. (1981) point out, while socioeconomic status may not be improved, existing nutrition programs may lead to increased energy intakes.

It appears from the findings of this investigation that food availability and eating patterns are more important than ethnic-genetic factors in explaining growth and adiposity increases during the period studied. Growth levels of the study sample comparing favorably with reference data for American children further strengthens the idea that deficits among Mexican-American children are unnecessary and preventable. However, fatness levels determined for the study sample are of particular interest in that juvenile obesity may begin during this period of accelerated growth (Zack et al., 1969). Due to the numerous health risks associated with obesity, further investigation should be conducted among older Mexican-American adolescents to determine whether or not growth as well as high adiposity trends continue.

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